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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/812,692

03/30/2004

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07/16/2007

EXAMINER

VALENROD, YEVGENY

ART UNIT

PAPER NUMBER

1621

MAIL DATE

DELIVERY MODE

07/16/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/812,692	<b>Applicant(s)</b> BROWN ET AL.	
	<b>Examiner</b> Yevgeny Valenrod	<b>Art Unit</b> 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) 34-49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11, 15-19, 26-30 and 33 is/are rejected.
- 7) ☒ Claim(s) 12-14, 20-25, 31 and 32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/8/05; 03/30/04</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Election/Restrictions***

Groups I and II are rejoined.

Claim 27, which was excluded from the restriction requirement is included in the elected group.

Claims 34-49 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected subject matter.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim defines arene hydrocarbon as XVI. Such definition is indefinite since no chemical name or structure is provided in the claim. Examiner suggests inserting a name or the structure of compound XVI into the claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 8, 9, 15, 17 and 18 rejected under 35 U.S.C. 102(b) as being anticipated by Sartori et al. (*J. Org. Chem.* **1993**, 58, 7271-7273). On page 7271, Scheme I, Sartori et al disclose a method of forming an aryl-aryl bond between two hydrocarbon molecules. The process is described on page 7272, column 2, 2<sup>nd</sup> paragraph of the experimental section. Sartori et al. use  $AlCl_3$ , DDQ, and HCl under room temperature in formation of aryl-aryl bond.

Claims 1, 4-6, 17 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Kovacic et al. (*Chem. Rev.* **1987**, 87, 357-379). On page 363, column 1, equation 4, Kovacic et al disclose aryl-aryl bond formation between two polycyclic hydrocarbon molecules. The process is carried out in the presence of a Lewis acid ( $FeCl_3$ ) and an organic oxidant ( $PhNO_2$ ).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 8, 9-11, 15-18 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sartori et al. (*J. Org. Chem.* **1993**, 58, 7271-7273).

*Scope of prior art*

On page 7271, Scheme I, Sartori et al disclose a method of forming an aryl-aryl bond between two hydrocarbon molecules. The process is described on page 7272, column 2, 2<sup>nd</sup> paragraph of the experimental section. Sartori et al. use  $AlCl_3$ , DDQ, and HCl under room temperature in formation of aryl-aryl bond.

*Ascertaining the difference between prior art and the instant claims*

Sartori et al teach forming aryl-aryl bonds, however they fail to teach quenching the reaction. (Claims 10, 11, 26)

Sartori et al also fail to teach performing the process at a temperature below 25°C. (Claim 16)

*Obviousness*

One of ordinary skill in the art would find it obvious to quench a reaction such as aryl-aryl bond formation in order to prevent undesired coupling of additional aryl components thus reducing the yield. Since acid is used in the process of Sartori, one would find it obvious to quench the reaction by neutralizing the acid. It is well within the skill of one of ordinary skill in the art to develop an adequate quenching procedure by routine experimentation.

Experimental conditions such as temperature are within routine experimentation that can be carried out by one of ordinary skill in the art. Limitations directed to temperature are not sufficient to render the claim patentable absent unexpected results.

Claims 1, 2, 3, 7, 27, 28, 29 and 30 rejected under 35 U.S.C. 103(a) as being unpatentable over Kovacic et al. (*Chem. Rev.* **1987**, 87, 357-379) in view of Sep et al (Tetrahedron, 1979, 35, 2161-2168).

*Scope of prior art*

Kovacic et al teach intramolecular aryl-aryl bond forming reaction (page 370, column 1, equation 12). Kovacic et al also describe the mechanism for the said process (page 359, Scheme IV). The described process proceeds via formation of aryl radical cations. The process utilizes  $\text{AlCl}_3$  and  $\text{CuCl}_2$  both of which are reagents commonly used in formation of radical cations (page 359, Table I, entry B; page 360, Table II, Entry A.).

*Ascertaining the difference between instant claims and prior art.*

Kovacic et al teach intramolecular aryl-aryl bond formation via radical cation intermediate. However, they fail to teach using quinone and Bronsted acid as reagents in the said bond formation.

*Secondary reference*

Sep et al. have studied the formation of aromatic radical-cations. Sep et al teach that DDQ together with TFA push the equilibrium in the radical-cation formation process completely to the right (page 2161, column 2, last paragraph).

*Obviousness and motivation*

One of ordinary skill in the art at the time the invention was made would have found it obvious to combine, with reasonable expectation success, the method of forming aryl-aryl bonds via radical cation intermediate as described by Kovacic et al with a method of producing aromatic radical cations as described by Sap et al. Motivation comes from the studies of Sap et al. on formation of radical cations using DDQ and TFA. Sap et al have shown that DDQ and TFA produce a high concentration of radical cations, which would reduce the time required to complete the bond-forming reaction.

*Claim Objections*

Claims 12-14, 20-25, 31 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 12-14 are directed to specific quenching agents. Although using a quenching agent is obvious, there is no motivation for one of ordinary skill in the art to choose the specific agents described in the said claims. Claims 20-25 and 31-32 are directed to specific aryl hydrocarbon reagents and products. Although the said compounds are not novel, the search of prior art has failed to uncover or suggest a method for their use or preparation using the conditions claimed by the applicant.

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**Conclusion**

Claims 1-49 are pending.

Claims 34-49 are withdrawn.

Claims 12-14, 20-25, 31 and 32 are objected to.

Claims 1-11, 15-19, 26-30 and 33 are rejected.

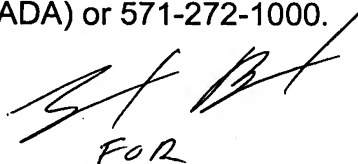
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yevgeny Valenrod whose telephone number is 571-272-9049. The examiner can normally be reached on 8:30am-5:00pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on 571-272-0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Yevgeny Valenrod

  
FOR

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